First report of cleaning activity of *Lepadogaster candolii* (Gobiesocidae) in the Mediterranean Sea

by

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RÉSUMÉ. - Premier signalement de l'activité de nettoyage de *Lepadogaster candolii* (Gobiesocidae) en Méditerranée.

L'activité de nettoyage de *Lepadogaster candolii* Risso, 1810 a été observée pour la première fois en août 2009, au cours d'une plongée réalisée dans la Réserve Marine des Îles Medes (Méditerranée nord-occidentale). L'individu nettoyait la cavité buccale d'un grand mérou *Epinephelus marginatus* (Lowe, 1834), qui restait bouche ouverte et immobile à quelque distance du substrat. Ce signalement apporte une information nouvelle quant au comportement alimentaire de cette espèce, considerée classiquement comme cryptobenthique.

Key words. - Gobiesocidae - *Lepadogaster candolii* - MED - Medes Islands - Cleaning behaviour - First record.

Cleaning behaviour is a specialized relationship between a cleaner and host, in which the host benefits from ectoparasite removal (Arnal *et al*., 2001), and the cleaner gets readily available prey from a living substrate (Zander and Sötje, 2002). The host benefits from long-term repeated parasite removal (Trivers, 1971), with the behaviour of the host determining the success of the cleaner (Zander and Sötje, 2002).

The primary cleaner fish in the Mediterranean Sea is the labrid *Symphodus (Crenilabrus) melanocercus*. Other species act as supplementary cleaners including juveniles of several wrasses: *Symphodus (Crenilabrus) mediterraneus*, *Symphodus (Crenilabrus) ocellatus*, *Symphodus (Crenilabrus) tinca*, *Thalassoma pavo*, *Coris julis* and *Ctenolabrus rupestris* (Zander and Sötje, 2002). Many of these clean only occasionally (Van Tassell *et al*., 1994).

Clingfish (Gobiesocidae) are associated with the cryptobenthic group (Patzner, 1999a). Due to their small size and cryptic life, little is known about their behaviour and ecology (Gonçalves *et al*., 1998; Patzner, 1999a). Usually, they live under rocks and crevices, feeding on small invertebrates. There are seven species described in the Mediterranean Sea (Hofrichter and Patzner, 2000), several of which can only be identified from collected specimens.

Lepadogaster candolii differs markedly both in ecology and behaviour from the remaining species of *Lepadogaster*. It is much more mobile than others species of clingfish and is found in many different habitats. *L. candolii* regularly inhabits boulder fields, but also resides in small cavities, overhangs and caves (Hofrichter and Patzner, 2000). In addition, the juveniles or subadults are found co-habiting with sea urchins, generally when the echinoderm covers a small hole, crevice or near seagrass meadows, beneath flat and overgrown stones in the rhizome zone of *Posidonia oceanica* (Patzner, 1999a, 1999b; Hofrichter and Patzner, 2000). It swims frequently in the water column and forages openly at considerable distance from shelter (Gonçalves *et al*., 1998; Hofrichter and Patzner, 2000).

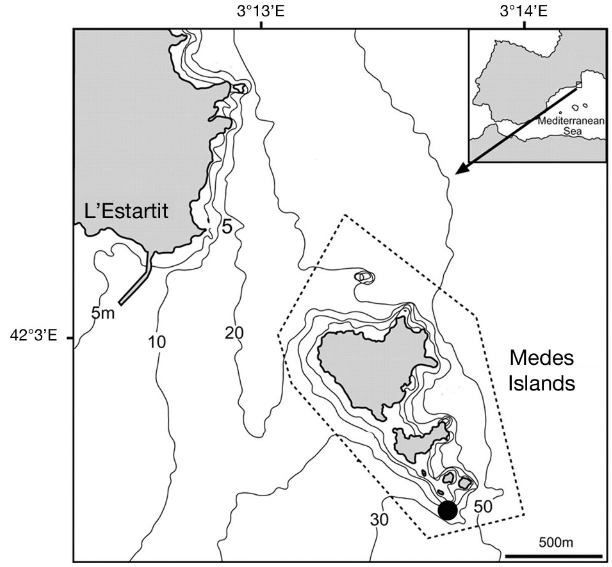

Figure 1. - Map of the Medes Islands Marine Reserve (NW Mediterranean) showing the area where the cleaning activity was observed.

In Australia two clingfish species of the genus *Cochleoceps* have been described to act as cleaners (Van Tassell *et al*., 1994). Up to now, only one species (*Diplecogaster bimaculata*) has been documented, in the Mediterranean, as a cleaner and it was on a moray eel (*Muraena helena*) (Patzner and Debelius, 1984) but, according to Van Tassell *et al*. (1994), *Lepadogaster candolii* is not a cleaner fish.

We document the feeding behaviour of *L. candolii* and show that it is a cleaner in the Mediterranean Sea.

MATERIAL AND METHODS

While SCUBA-diving, August 2009 at Medes Islands Marine Reserve (Fig. 1), a large dusky grouper *Epinephelus marginatus* was observed in a cave (2 m x 2 m) at 16 meters depth. It was stationary, 50 cm off the ground and kept its mouth wide open. Upon closer investigation, a small clingfish (*Lepadogaster candolii*) was observed gliding in and out of the grouper's mouth (Figs 2, 3).

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RESULTS

Both, grouper and clingfish, exhibited a typical cleaning behaviour, with the host holding its mouth open, remaining motionless and allowing the clingfish to glide in and out of its mouth. The clingfish was at an unusually far distance from the ground, although this is the most active and free swimming of all mediterranean clingfish species.

DISCUSSION

Epinephelus marginatus and *Lepadogaster candolii* are both a very common species in western Mediterranean and in eastern Atlantic from British Isles to the Canary Islands.

According to Mazé (2007), there are differences in the diet of *Lepadogaster lepadogaster* and *L. candolii*. *Lepadogaster lepadogaster* is strictly benthophagous showing a specialization in amphipods and gastropods while *L. candolii* has a more diversified diet. Gut contents of this last species reveals remains of tube feet and echinoderm pedicellaria. The frequency of Gnathiidae juveniles (ectoparasitic isopods on fishes) in their stomach contents, embedded in mucus, and fish scales would indicate that *Lepadogaster candolii* is propably a non-specialised cleaner (Mazé, 2007).

In conclusion, this paper documents *L. candolii* as a cleaner in the Mediterranean Sea. Additional observations are required to determine the extent of this activity within the Mediterranean.

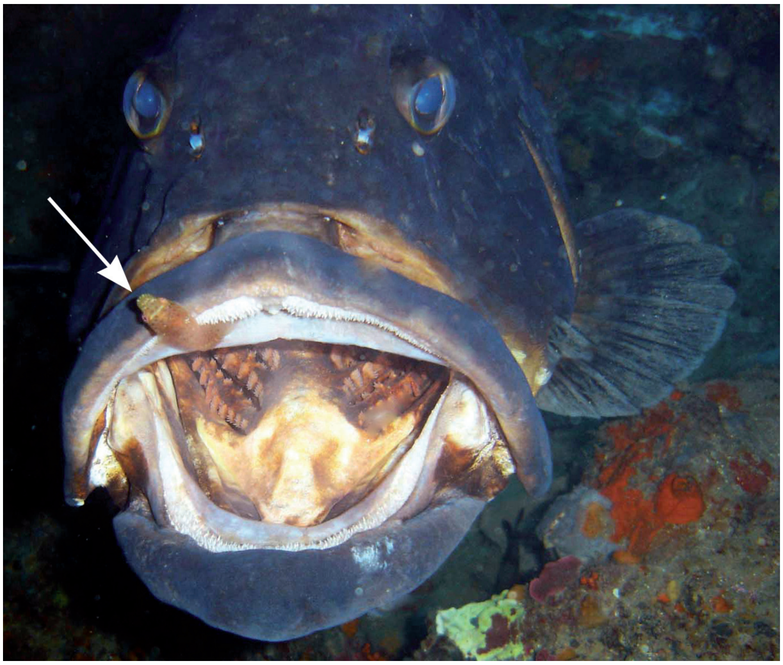

Figure 2. - *Epinephelus marginatus* observed in the Medes Islands holding its mouth wide open while a *Lepadogaster candolii* swims out of it.

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